



Sonderforschungsbereich 631
Festkörperbasierte Quanteninformationsverarbeitung



im Mai 2005

SEMINARANKÜNDIGUNG

Dienstag, 03. Mai 2005

17.15 Uhr

WSI, Seminarraum S 101

„ Electron spin decoherence due to interaction with nuclear spins: Mechanisms and control “

In this seminar I will argue that nuclear spins of the host lattice are the dominant source of decoherence in semiconductor spin-based proposals for quantum computation. There are two channels for nuclear induced decoherence: (1) Visibility loss and (2) Spectral diffusion. We performed numerical calculations to show that combined application of a moderate static magnetic field (~ 2 Tesla) and Hahn echo is enough to suppress mechanism (1) within the 10^4 criteria of quantum error correction. On the other hand a much greater overhead is required to control mechanism (2), which leads to Hahn echo decay time (T_2) significantly smaller than energy relaxation time (T_1). We consider the Carr-Purcell-Meiboom-Gill sequence as a means to control (2) and provide a realistic assessment of the required overhead in number of qubit -pulses.

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